the results of appropriate bioassays are the relevant consideration.

Vaught and King state that the potential nitrosation P has received little attention (*25*). In fact, nitrosation of P was achieved under nonphysiological conditions, whereas under conditions more nearly physiological, nitrosation was quite inefficient (*25*). Perhaps bioassays of nitrosation products of P have already been conducted (*6–8*), as these studies employed extreme and artifactual conditions. We obviously feel that this is a likely possibility. Therefore, the negative bioassays of P and APC, which were conducted under conditions more closely duplicating the manufacturing practices employed in pharmaceutical production and clinical reality, argue strongly against the carcinogenicity of P. We emphasize that AM and nitrosation products of AM and AT, which can be produced under physiological conditions, are mutagenic. We are not aware that bioassays of AM and AT alone or of nitrosation products of AT have ever been conducted. As ingredients in analgesic formulations that may or may not also contain P, neither compound can be removed from suspicion in cases of urinary tract neoplasia presumably resulting from chronic abuse of compound analgesic formulations.

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A Scientist's Tithe?

Edward Wenk's editorial (16 Nov., p. 771) on the responsibility of scientists to devote part of their intellectual energies to informing their fellow citizens about their own fields and advances therein is long overdue. The lesson of Harrisburg is clear. The basic perceptions of the American public have been shaped by the failures of communities—that of the scientists first and of the press second. One needs no further proof of the latter than to examine the very different treatment of the incident in, say, the United States on the one hand (with a free but antinuclear leaning press) and, say, India (with a free but pronuclear leaning press) with Britain in the middle. The "3P" risk equation holds. Perception = Probability × Propaganda. The brokering of science information to and by unaided journalists is surely one of our culture's grossest failures: we have created a nation of tourists in their native technological land.

But what of the scientist's responsibility? Whose fault is it that we have a scientifically illiterate populace? Mainly our own. Our reductionist-specialization model has led us to encourage increasingly narrow training. Our imperial instincts suggested that what we should be concerned with in high schools was making superb curricula so that young scientist-geniuses might bud even earlier. Each professional society recited its Latin masses within its own set, closed not only to laymen, but more and more to other scientists and engineers.

Who was supposed to interpret all this to our colleagues in a university, to our families, to our representatives in government? Not me. I had to write that proposal, give that paper in London, tinker with the new equipment until 3 a.m., seek the recognition of my peers. The Wenk editorial points especially to the responsibility of the professional societies, or every *group* of scientists. And it is indeed astonishing that, even today, the National Academy of Engineering (and the National Academy of Sciences) has no standing committee on the public understanding of technology (and science). I believe, however, that this solution—at the society level—is not enough by itself. The urgency of educating ourselves and our culture to have a more balanced view of science and technology, with all the ambivalence of their impacts on humanity, demands action simultaneously at two other levels of organization.

First, the government agencies and Congress have a responsibility. Supporting research is no longer enough. To paraphrase Oliver Wendell Holmes' famous aphorism about justice: Research must not only be done, it must be known (by the public in broad outline) what has been done. Congress could require every agency and subagency to devote a fixed percentage of their budget to funding multiple-source interpretation of the results of the work it sponsors.

Second, scientists have a responsibility at the personal level. Asking societies, government branches, and agencies to be responsible will not work unless there is a personal commitment to the importance of this part of a scientist-engineer's profession. We must all do our part to share the meaning of our work. In a speech given in 1931 at Caltech, Einstein said (a quote curiously omitted from the centenary celebration):

> It is not enough that you should understand about applied science in order that your work may increase man's blessings. Concern for man himself and his fate must always form the chief interest of all technical endeavors, concern for the great unsolved problems of the organization of labor and the distribution of goods—in order that the creations of our mind shall be a blessing and not a curse to mankind. Never forget this in the midst of your diagrams and equations.

The Judeo-Christian tradition demanded tithing of one's worldly goods. It would not be unfitting if science and technology, the prodigal children of this tradition, continued that demand by requiring each practitioner to give a tithe of time and resources for interpreting her or his craft to the public.

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